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lish, showing that, though not very dissimilar in head-form, they were strongly distinguished in color of hair. He expressed his belief in the presence of a Finnish or Ugrian element in the population of Scotland, which was also found in Wales, and was marked among other characteristics by oblique eyes. The Iberian element, which had doubtless been strong among the Picts, continued to be so in many parts of Scotland, for example, in Wigtownshire and the upper part of Aberdeenshire, and in a great part of the Highlands.

The concluding part of the last lecture was devoted to an appreciation of the three (or, counting the Finns, four) great races which now divide Europe, of which the central, Alpine, brown, thick-set, broad-headed race seems the one most likely to spread at the expense of its neighbors. The question of race *versus* environment was also summed up, to the advantage, on the whole, of the former.

THE ABORIGINAL NORTH AMERICAN TEA.[1]

THERE is a shrub or small tree, a species of holly (Ilex cassine), growing in the Southern States along the seacoast, not extending inland more than twenty or thirty miles, from Virginia to the Rio Grande. Its leaves and tender branches were once used by the aboriginal tribes of the United States in the same manner as the Chinese use tea and the South Americans use maté. But while the use of *Thea sinensis* and *Ilex paraguayensis* still survives, the use of the shrub above mentioned has been almost abandoned by our native Indians and by the white people who once partially adopted it as a beverage.

The reason for its disuse is hard to discover, for, in common with tea and maté, it contains caffeine, or a similar alkaloid. The object of this paper is to examine its history, to suggest its restoration to a place among the stimulant beverages, and to inquire into its possible economic value.

I have been able to trace its use as a beverage back to the legendary migration of the Creeks from their supposed far western home to the seacoast of the Carolinas. Whether it was used by the prehistoric mound builders is a question which may not at present be solved. But some archæologist of the future may find in the remains of the mound-builders or their predecessors proof of its use among them.[2]

The leaves and young tender branches were carefully picked. The fresh cassine was gathered at the time of harvest or maturity of the fruits, which was their New Year. The New Year began with the "busk," which was celebrated in July or August, "at the beginning of the first new moon in which their corn became full eared," says Adair. The leaves were dried in the sun or shade and afterwards roasted. The process seems to have been similar to that adopted for tea and coffee. The roasting was done in ovens, remains of which are found in the Cherokee region, or in large shallow pots or pans of earthenware, such as the Indian tribes made.

These roasted leaves were kept in baskets in a dry place until needed for use. Loudonniere (1564) writes of being presented with baskets filled with leaves of the cassine.

Was it an article of commerce? There seems to be no doubt on this subject. Allusions to the drinking of the "black drink" are found, indicating its use among tribes residing at a long distance from the habitat of the cassine.

Lawson (1709) writes of its being "collected by the savages of the coast of Carolina, and from them sent to the westward Indians and sold at a considerable price." Dr. Porcher, author of the "Resources of the South," says: "The Creek Indians used a decoction of the cassine at the opening of their councils, *sending to the seacoast for a supply*," and adds that the coast Indians sent it to the far west tribes. How far its use extended northward, I cannot ascertain. From some allusions of the early French writers, I think it was used by the Natchez, and that it was sent up the Mississippi from the coast of Louisiana. The Indians of Wisconsin, Illinois, and westward, used a decoction of willow leaves as a beverage, but I cannot find that they used it in ceremonials, or that it was looked upon with the same reverence.

It appears from the accounts of various early writers that there were several methods of preparing the black drink.

(1) The decoction made of the fresh leaves and young branches.

(2) A decoction of the dried and roasted leaves. It is probable that the leaves during roasting developed new qualities, as the roasting of coffee brings out the aromatic odor due to a volatile oil.

(3) A decoction which was allowed to ferment. In this condition it became an alcoholic beverage, capable of causing considerable intoxication, similar to that caused by beer or ale.

The early history of the use of *Ilex cassine* as a beverage is lost in the darkness of prehistoric ages. Probably the same can be said of tea, coffee, maté, and cocoa. But it is a singular fact that while all the latter beverages still continue to be used in the countries where they are indigenous, as well as all over the world, the use of cassine is nearly extinct, as it is now only used occasionally in certain important religious ceremonies by the remnants of the Creek Indians, and will disappear with them unless rescued by chemical research and its use revived for hygienic or economical reasons.

The very earliest mention of cassine was made in the "Migration Legend of the Creek Indians." This curious legend has been lately published by A. S. Gatschet of the Bureau of Ethnology, Washington, D.C., with text, glossaries, etc. In his preface he says: "The migration legend of the Kosihta tribe is one of the most fascinating accounts that has reached us from remote antiquity and is mythical in its first part." This tribe was a part of the Creek nation. Its chief, Tchikilli, read the legend before Governor Oglethorpe and many British authorities in 1735. It was written in red and black characters (pictographic signs) on a buffalo skin. This was sent to London, and was lost there; but, fortunately, a text of the narrative was preserved in a German translation.

It begins by narrating that the tribe started from a region variously supposed to be west of the Mississippi, or in southern Illinois, or southern Ohio. They travelled west, then south, then south-east, until they reached eastern Georgia. Here they met a tribe, called in the legend the "Palachucolas," who gave them "black drink" as a sign of friendship, and said to them, "Our hearts are white, and yours must be white, and you must lay down the bloody tomahawk, and show your bodies as a proof that they shall be white."

This was evidently the first knowledge the Kosihta tribe had of this beverage.

The black drink made by the Seminoles is described as "nauseous to the smell and taste, and emetic and purgative." It is a mixture and not brewed of the cassine alone. All our beverages, such as tea, coffee, maté, and even chocolate, when drunk very strong, are capable of causing diuresis, purging, and vomiting.

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[1] Abstract of Bulletin No. 14, U. S. Department of Agriculture, Division of Botany, Edwin M. Hale, M.D., Chicago, Ill.

[2] This was written before Professor Venable's recent investigations.

One peculiarity of the drinking of the black drink is that, so far as I can ascertain, it was not used at their meals as we use tea and coffee, but wholly as a social beverage or at festivals and other public occasions. I do not think the women were allowed to drink it, at least not publicly. Authorities differ on this point.

Among the Creeks the women sometimes prepared the black drink, but Narvaez writes that the Indians on the coast of what is now Texas did not allow a woman to come near it during its preparation.

That a beverage containing caffeine should fall into disuse and become almost forgotten is a singular fact. The use of maté has not decreased from the time of the conquest of South America by Europeans. The reason why the latter is still in use and the former not lies, perhaps, in the fact that the Europeans in South America mixed with the natives, married, and adopted their customs, while the English and French who settled the Gulf States did not associate with the Indians, and adhered to the use of Chinese tea. Now that we know that the leaf of the cassine contains caffeine or theine, can its use as a beverage be revived?

It is not as pleasant in odor and taste as *Thea sinensis*, and this may be against it; on the other hand, it seems to have some salutary properties which the latter does not possess, and may, perhaps, be far more cheaply obtained.

A rough estimate can be made as to the number of square miles upon which it grows. Estimating the coast line from the James River, in Virginia, to the Rio Grande, in Texas — about 2,000 miles — and multiplying this by 20 miles, the extent of its growth inland, we get a total of about 40,000 square miles. On this area could be picked an immense quantity of leaves, and if the trees are not destroyed in the picking the crops could be harvested every year. No estimate can be approximated even of the amount of the crop of leaves which could be gathered, because we can not estimate the number of trees on this area.

It would seem possible that further inquiries on this point and careful experiments in cultivation and manipulation might result in furnishing our market with a product which would be found in many cases an acceptable and useful substitute for the more expensive imported teas.

LETTERS TO THE EDITOR.

**** Correspondents are requested to be as brief as possible. The writer's nam is in all cases required as proof of good faith.*

On request in advance, one hundred copies of the number containing his communication will be furnished free to any correspondent.

The editor will be glad to publish any queries consonant with the character of the journal.

Rain-Making by Concussion in the Rocky Mountains.

IN connection with the recent discussions of the effects of explosions in producing rain, it ought to be noted that for twenty years or more the Rocky Mountains have afforded excellent opportunities for observing the effects upon rainfall of heavy explosions at high elevations. There are in this region thousands of mines, mining claims with open cuts and adits, and quarries at elevations from 5,000 to 13,000 feet. Nitro-glycerine preparations are now the explosives used in blasting. During the summer there is a great amount of blasting high on the mountains. Several railways and wagon roads reach 9,000 to 12,000 feet, and the grading of these afforded much blasting. I have made considerable inquiry and found no one who had observed any connection between the explosions and rain-fall. Probably few or none were especially on the watch for such connection, but if there were any very obvious connection it would have been observed, since there have been so many years of opportunity.

About two years ago the cog-wheel road was graded to the top of Pike's Peak. Thinking that explosions on a high isolated mountain, rising far above the adjacent country like Pike's Peak, would produce rain if anywhere, I especially noted the weather. Tremendous explosions occurred daily for some months. The reports were often heard 30 to 40 miles, and many of them were at elevations between 13,000 and 14,147 feet. Yet all this happened in one of the dryest years ever known in Colorado, when often for days or weeks there was no precipitation even on the mountains.

G. H. STONE.

Colorado Springs, Jan. 12.

Rain-Making.

IN *Science* for Nov. 27, 1891, appeared an article from the pen of Professor Lucien I. Blake of the State University of Kansas, entitled "Can We Make it Rain?" in which some suggestions are made as to the proper method of conducting experiments to that end, drawn from the discoveries of Mr. John Aitken of Scotland, who has shown that unless there be dust particles in the air the aqueous vapor therein contained will not, in condensing, form itself into drops. Professor Blake argues from this that, instead of using guns or apparatus for producing terrific noises, the better way would be to send up inexpensive fire balloons carrying impalpable powders, which could be thus scattered through the air; or else carrying sulphur or gun-powder, the smoke of which, when they were ignited, would furnish the dust particles, which, it is assumed, are the only requisites for artificially setting in motion the process of nature that brings rain.

The reasoning of Professor Blake in leading up to this conclusion and in combatting the idea that concussion is a necessary factor in artificial rain production, contains much that appears sound from the standpoint of both science and good sense, and yet much that will not bear examination. His contention that thunder does not, to any extent, cause condensation of vapor, but is rather the result of it, is one which I have always held to, for latent heat is given out by condensing vapor, and this heat may appear in the form of electricity, and cause the lightning-flash that makes the thunder. The idea, also, that powder smoke may be a factor in rain production when rain is caused by a battle, is a logical deduction from Mr. Aitken's discovery. Professor Blake also avoids the blunder committed by Professor Simon Newcomb, in his article in the October number of the *North American Review*, where the latter lays himself open to the imputation of being himself guilty of the very thing he charges against the advocates of the concussion theory, viz., of "ignoring or endeavoring to repeal the laws of nature." This he does by asserting that ten seconds after the sound of General Dyrenforth's last bomb had died away "everything in the air — humidity, temperature, pressure, and motion — was exactly the same as if no bomb was fired," thus abolishing at one stroke the principle of the conservation of forces. Professor Blake, with less zeal but greater wisdom, practically admits that the forces brought into action by explosions are resolved into heat, and he does not, like Newcomb, annihilate this heat, though unwilling to admit that it can do work. Professor Blake also has the good sense to recognize the fact that the question of artificial rain production cannot be settled by laboratory experiments — a thing that cannot be said of all the assailants of the concussion theory.

But his contention that if concussion causes rain "the greatest effect — the practical effect — must follow close upon the concussion," cannot be sustained. While I reserve for a more extended article to be published elsewhere a full consideration of this question, I will here say, briefly, that the well demonstrated theory of the late Professor M. F. Maury that there are two great atmospheric currents, the equatorial and the polar, flowing above us in nearly opposite directions, furnishes the basis for a perfect explanation of the reason why the centre of the atmospheric disturbance caused by a battle should remain in the vicinity of the battle-field while the two currents are mixing together and initiating the process that leads to rain — a process which, it is plain, must require time in reaching a state of effective action.

But these points in the discussion are not so much what I desire to consider at this time as the special method recommended by Professor Blake for conducting rain-making experiments. The